

WALNUT BASIN TOTAL MAXIMUM DAILY LOAD

Water Body: Walnut River in Butler County

Water Quality Impairment: Nutrients and Oxygen Demand Impact on Aquatic Life

1. INTRODUCTION AND PROBLEM IDENTIFICATION

Subbasin:	Upper and Lower Walnut
Counties:	Butler, Harvey, Marion, and Sedgwick
HUC 8:	11030017
HUC 11 (HUC 14s):	010 (010, 020, 030, and 040) 020 (010, 020, 030, 040, 050, 060, 070, and 080) 030 (070) 040 (010, 020, 030, and 040)
HUC 8:	11030018
HUC 11 (HUC 14s):	010 (010, 020, and 030)
Drainage Area:	818 square miles
Main Stem Segment:	WQLS: 1, 10, 14, & 15; starting at the confluence with Muddy Creek, traveling upstream, and ending at the confluence with the Whitewater River
Designated Uses:	Primary & Secondary Contact Recreation; Domestic Water Supply; Food Procurement; Ground Water Recharge; Industrial Water Supply Use; Irrigation Use; Livestock Watering Use on Main Stem Segments. Special Aquatic Life Support and exceptional state water designation on segment 10 Expected Aquatic Life Support on segments 1, 14, and 15
1998 303(d) Listing:	Table 2—Stream Segments Identified by Biological Monitoring
Impaired Use:	Aquatic Life Support on Main Stem Segments.
Water Quality Standard:	General-- Narrative: Surface water shall be free, at all times, from the harmful effects of substances that originate from artificial sources of pollution and that produce any public hazard, nuisance condition or

impairment of a designated use. (KAR 28-16-28e(b)(1)).

2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

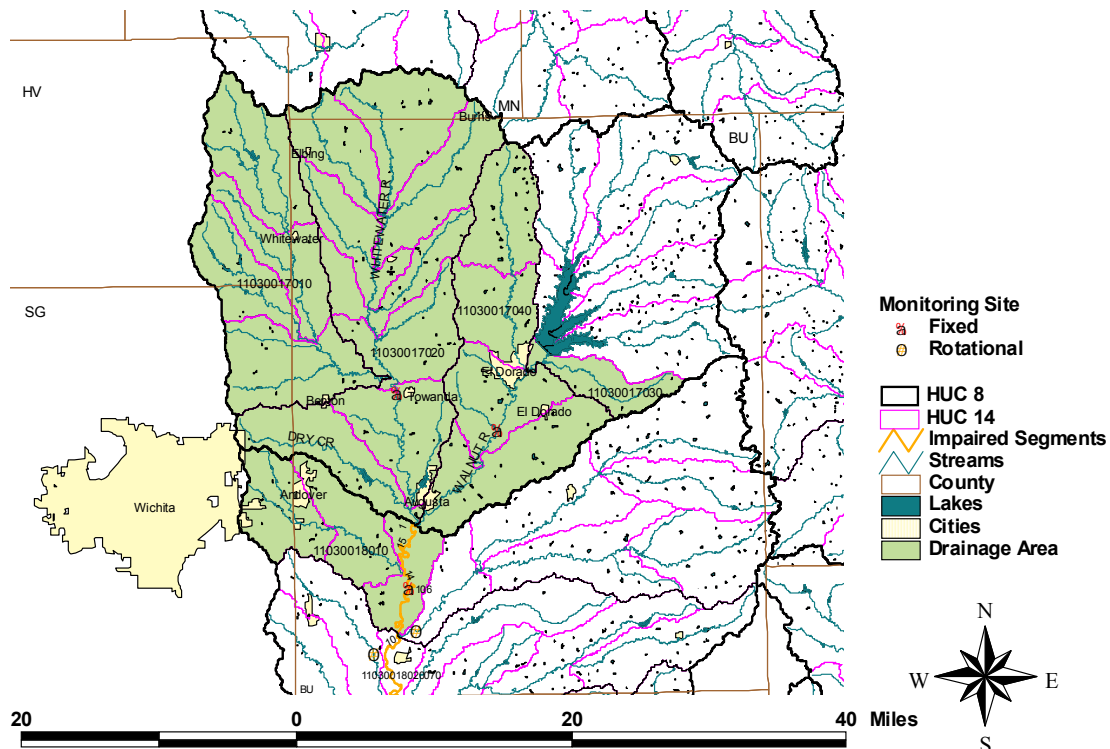
Level of Support for Designated Use under 1998 303(d): Partially Supporting

Monitoring Sites: Stream chemistry/biological monitoring station 106 at Gordon (Figure 1)

Period of Record Used: 1985 - 2001 for Stream Chemistry
1982 - 2001 for Biological Monitoring

Figure 1

Walnut River/Butler County TMDL Reference Map



Flow Record: Walnut River at Winfield (USGS Station 07147800); 1921 to 2001.

Current Conditions:

Three main parameters (MBI, %EPT, and BOD) were analyzed to address the nutrient/oxygen demand impairment. The Macroinvertebrate Biotic Index rates the nutrient and oxygen demanding pollution tolerance of large taxonomic groups (order and family). Higher values indicate greater pollution tolerances. Along with the number of individuals within a rated group, a single index value is computed which characterizes the overall tolerance of the community. The higher the index values the more tolerant the community is of organic pollution exerting oxygen demands in the stream setting. Index values greater than 5.4 are indicative of non-support of the aquatic life use; values between 4.51 and 5.39 are indicative of partial support and values at or below 4.5 indicate full support of the aquatic life use.

The EPT index is the proportion of aquatic taxa present within a stream belonging to pollution intolerant orders; Ephemeroptera, Plecoptera and Trichoptera (mayflies, stoneflies and caddisflies). Higher percentages of total taxa comprising these three groups indicate less pollutant stress and better water quality.

On this stream segment, the average MBI value of 4.62 (range: 4.25-5.62) indicates that aquatic life support is partially impaired (MBI between 4.51 and 5.39). Forty percent of the surveys resulted in MBI values over 4.5; the rest were under 4.5, indicative of full support of aquatic life. Average MBI under partial support conditions was 4.98; average MBI under full support conditions was 4.39. When aquatic life is partially impaired, the percentage of EPT taxa ranges from 16.1 - 61.0% (38.1% average). Under full support conditions, the percentage averages 58.2%.

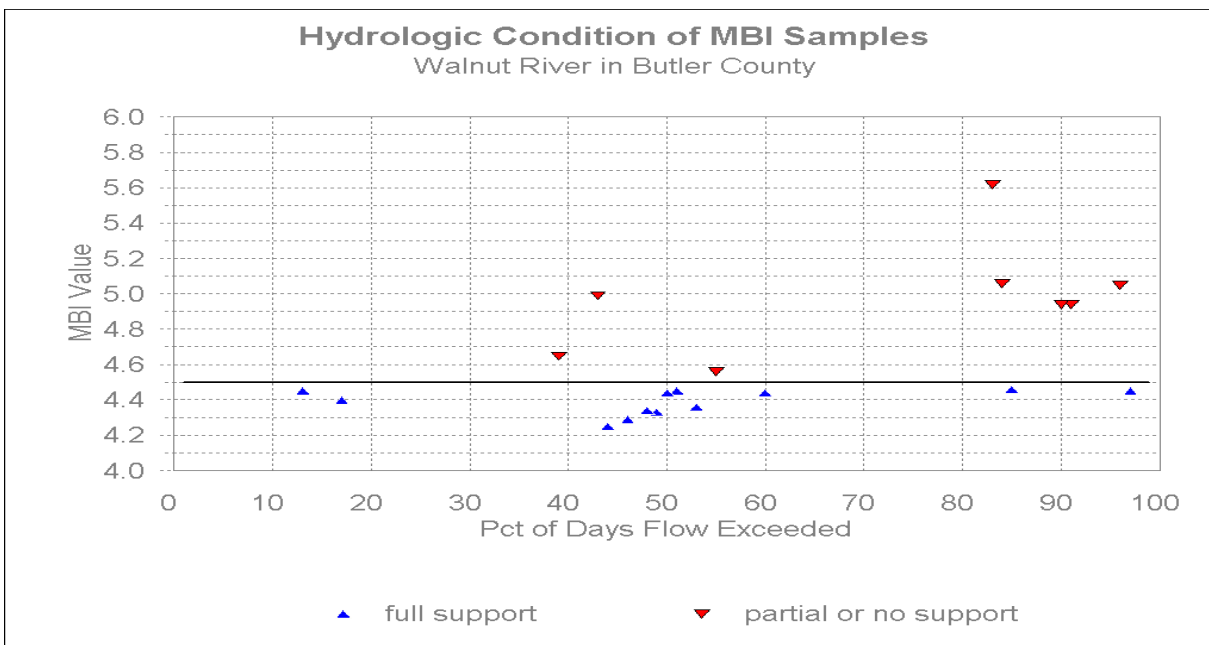
There does not appear to be a direct link between elevated levels of probable pollutants and MBI scores indicating partial or full impairment. Other than nitrate, ambient stream conditions bracketing the biological sampling period are not significantly different when full support or impairment is indicated. Relations between the Biotic index and the various parameters are displayed in the Appendix.

Average Concentrations under Different Aquatic Life Support Conditions

MBI	No.	EPT	NH3	TSS	BOD	NO3	TP	pH	Temp	Cl	SO4	TDS
Fully Supporting ALS (MBI ≤ 4.5)	12	60%	0.045 mg/l	60 mg/L	4.9 mg/L	0.91 mg/l	0.29 mg/l	8.3	23 C	94 mg/l	165 mg/l	593 mg/l
Partial or No Support of ALS (MBI > 4.5)	8	37%	0.054 mg/l	117 mg/L	4.9 mg/L	0.46 mg/l	0.31 mg/l	8.2	19 C	97 mg/l	184 mg/l	620 mg/l

There are some differences in the average concentration of ammonia and total suspended solids, but those averages tend to be influenced by a single outlier and are not significantly different. There is no evidence of nutrient impairment leading to a degradation of the macroinvertebrate communities. In fact, there is only one apparent factor which seems to correlate with diminished aquatic life support; flow condition. Plotting MBI against the flow exceedance reveals that the central mass of partial support conditions tends to hover in the low flow (80-99%) range,

whereas the central mass of full support conditions tends to be placed around median flow. Anecdotal description of the sampling sites has observed a good riffle substrate which tends to be fairly shallow, therefore susceptible to lower flows leading to dessication of the aquatic habitat, and impairment of the macroinvertebrate community.



Biological index values and average nutrient and sediment concentrations were compared for the biological monitoring stations located in the Walnut Basin. Overall, the average concentrations of nutrients and sediment at the Butler County sampling site tend to be similar to samples taken from the Cowley County sampling site.

Comparison of Biological Index Values and Average Nutrient and Sediment Concentrations

Station	MBI	Ammonia	BOD	TSS
SB106 Walnut River at Gordon	4.6	0.061 mg/L	4.7 mg/L	79 mg/L
SB315 Walnut River at Hackney (SC523)	4.5	0.067 mg/L	4.2 mg/L	71 mg/L

Desired Endpoints of Water Quality at Site 106 over 2007 - 2011:

The use of biological indices allows assessment of the cumulative impacts of dynamic water quality on aquatic communities present within the stream. As such, these index values serve as a baseline of biological health of the stream. Sampling occurs during open water seasons (April to November) within the aquatic stage of the life cycle of the macroinvertebrates. As such there is no described seasonal variation of the desired endpoint of this TMDL. The endpoint would be average MBI values of 4.5 or less over 2007-2011.

Achievement of this endpoint would be indicative of full support of the aquatic life use in the stream reach. While there is some linkage between MBI values and flow conditions, there is inconclusive evidence implicating any pollutant. Therefore, this TMDL will be phased, concentrating on maintaining ammonia, biochemical oxygen demand, and total suspended solids levels below their average, while assessing other causes for the sporadic impairment seen in the macroinvertebrate community.

3. SOURCE INVENTORY AND ASSESSMENT

NPDES: There are ten NPDES facilities that have effluent limitations for biochemical oxygen demand, total suspended solids, and ammonia (Figure 2). Additionally, fifteen facilities are permitted by the state as non-overflowing lagoons that would only contribute BOD, TSS, and ammonia load to the Walnut River under extreme precipitation events (flow durations exceeded up to 5 percent of the time). Such events would not occur at a frequency or for a duration sufficient to cause an impairment in the watershed and have not been documented as a cause of the impairments seen at Monitoring Site 106. All of the discharging and non-overflowing systems are outlined in the two tables below.

Discharging NPDES Sites

MUNICIPAL FACILITY	STREAM REACH	EXPIRATION DATE	DESIGN FLOW	TYPE
Andover WWTP	Walnut River via Four Mile Creek	4/30/2005	1.2 MGD	Mechanical
Augusta WWTP	Walnut River	12/31/2003	1.50 MGD	Mechanical
Benton WWTP	Whitewater Rv. via W. Br. Whitewater Rv.	1/1/2005	0.076 MGD	Three Cell Lagoon
Elbing WWTP	Whitewater Rv. via Henry Creek	8/31/2005	0.029 MGD	Three Cell Lagoon
El Dorado WWTP	Walnut River	12/31/2005	1.75 MGD	Mechanical
El Dorado Mobile Home Estates	Tributary of Walnut River	1/1/2005	0.0069 MGD	Two Cell Lagoon
Four Mile Creek Regional WWTP	Walnut River via Four Mile Creek	12/31/2005	Average = 1.5 MGD (3.0 MGD for upgrade)	Mechanical
KTA - Towanda Service Area	Whitewater River via unnamed stream	1/31/2005	0.0116 MGD	Three Cell Lagoon
Towanda WWTP	Whitewater River via unnamed stream	8/31/2005	0.19 MGD	Mechanical

Whitewater WWTP	W. Br. Whitewater R.	12/31/2005	0.162 MGD	Mechanical
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All of these facilities have permit limits for BOD and TSS, the mechanical plants also have seasonal permit limits for ammonia. Examination of the discharge monitoring reports for the facilities indicate few problems in violating permit limits. Additionally, most of the lagoons have not discharged during the critical low flow seasons, evaporation apparently exceeding the inflow of wastewater into the lagoon systems. The mechanical plants, generally, discharge low (< 10 mg/l) BOD to their respective receiving streams. Similarly, ammonia levels are low, in the vicinity of 1 mg/l. One of the sources, KTA-Towanda, has had a history of problems meeting BOD limits and is under administrative order to upgrade its system and achieve compliance.

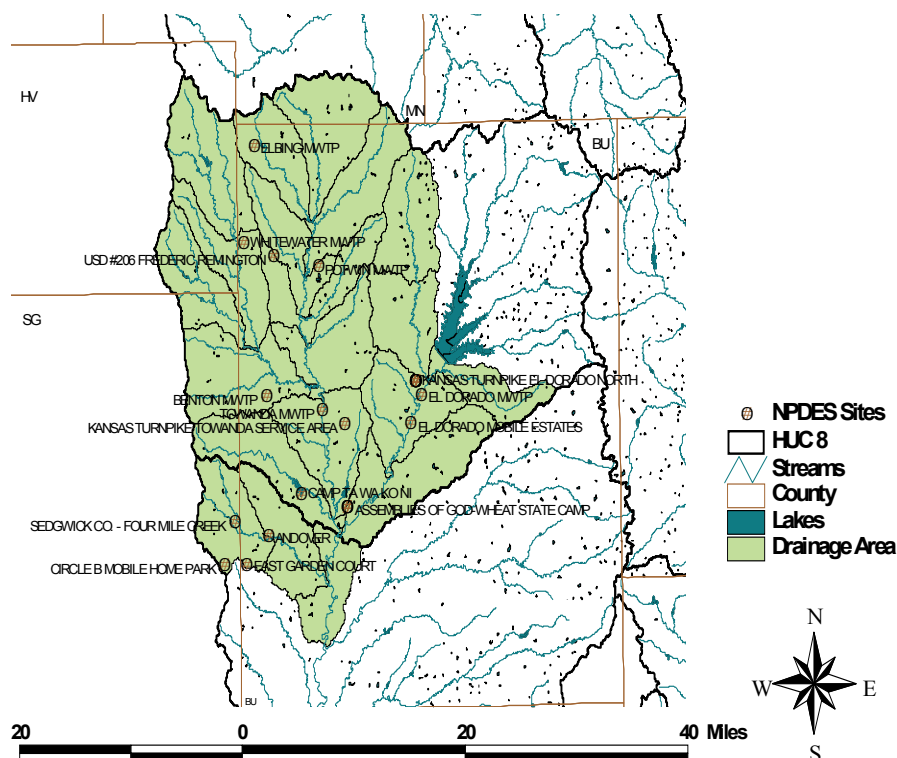
The watershed is expecting strong growth, particularly along its west side. The population projection for Andover to the year 2020 indicates heavy growth (65.9%). Projections for Wichita, Whitewater, Augusta, El Dorado, Towanda, Benton, and Elbing to the year 2020 indicate moderate growth: 15.9%, 12.4%, 23.2%, 19.8%, 23.5%, 34.4% and 27.6% respectively. Upgraded facilities able to accommodate the growth of these communities will be expected, along with application of the appropriate permit limits in the face of such growth. For example, the Four Mile Creek Regional Facility is anticipating doubling its effluent volume in time. The current permit has applied limits, notably for ammonia, in anticipation of this facility upgrade.

Non-Overflowing Lagoons

MUNICIPAL FACILITY	EXPIRATION DATE	TYPE
Assemblies of God - Wheat State Camp	12/31/2006	Two-Cell Lagoon
Butler Co. S.D. #8 WTF	8/31/2006	Two-Cell Lagoon
Butler Co. S.D. #16 WTF	2/1/2001	Two-Cell Lagoon
Camp Ta Wa Ko Ni	8/31/2006	Two-Cell Lagoon
Circle B Mobile Home Park	12/31/2005	Two-Cell Lagoon
East Garden Mobile Home Park	12/31/2001	One-Cell Lagoon
KDWP - Bluestem Point # 1 & 2 WTF	8/31/2006	Two-Cell Lagoon
KDWP - Shady Creek Area WTF	1/1/2005	Three-Cell Lagoon
KDWP - Park Office WTF	1/1/2006	Two-Cell Lagoon
KDWP - Boulder Bluff WTF	1/1/2006	Two-Cell Lagoon
KTA El Dorado North Interchange	10/31/2005	Two-Cell Lagoon
Parks, Inc. WTF	12/31/2006	Two-Cell Lagoon
Potwin WTF	9/30/2006	Two-Cell Lagoon
USD #205 WWTP	12/31/2006	Two-Cell Lagoon

Figure 2

Walnut River/Butler County NPDES Sites



Livestock Waste Management Systems: Eighty-eight operations are registered, certified, or permitted within the watershed (Figure 3). These facilities are clustered in the upper half of the watershed. The facility type is either beef (42), dairy (4), swine (38), sheep (2), kennel (1), or horse (1). Nine of these 88 facilities are NPDES permitted, non-discharging beef and/or swine facilities with 40,478 animal units. All permitted livestock facilities have waste management systems designed to minimize runoff entering their operations or detaining runoff emanating from their areas. Such systems are designed to retain the 25 year, 24 hour rainfall/runoff event, as well as an anticipated two weeks of normal wastewater from their operations. Such a rainfall event typically coincides with stream flows which are exceeded 1-5 percent of the time. Therefore, events of this type, infrequent and of short duration, are not likely to cause chronic impairment of the designated uses of the waters in this watershed. Requirements for maintaining the water level of the waste lagoons a certain distance below the lagoon berms ensure retention of the runoff from the intense, local storms events. In Butler County, where many of the facilities

are relatively close to the river, such an event would generate 6.3 inches of rain, yielding 5.1 to 5.9 inches of runoff in a day. Potential animal units for all facilities in the watershed is 68,966 animal units. The actual number of animal units on site is variable, but typically less than potential numbers.

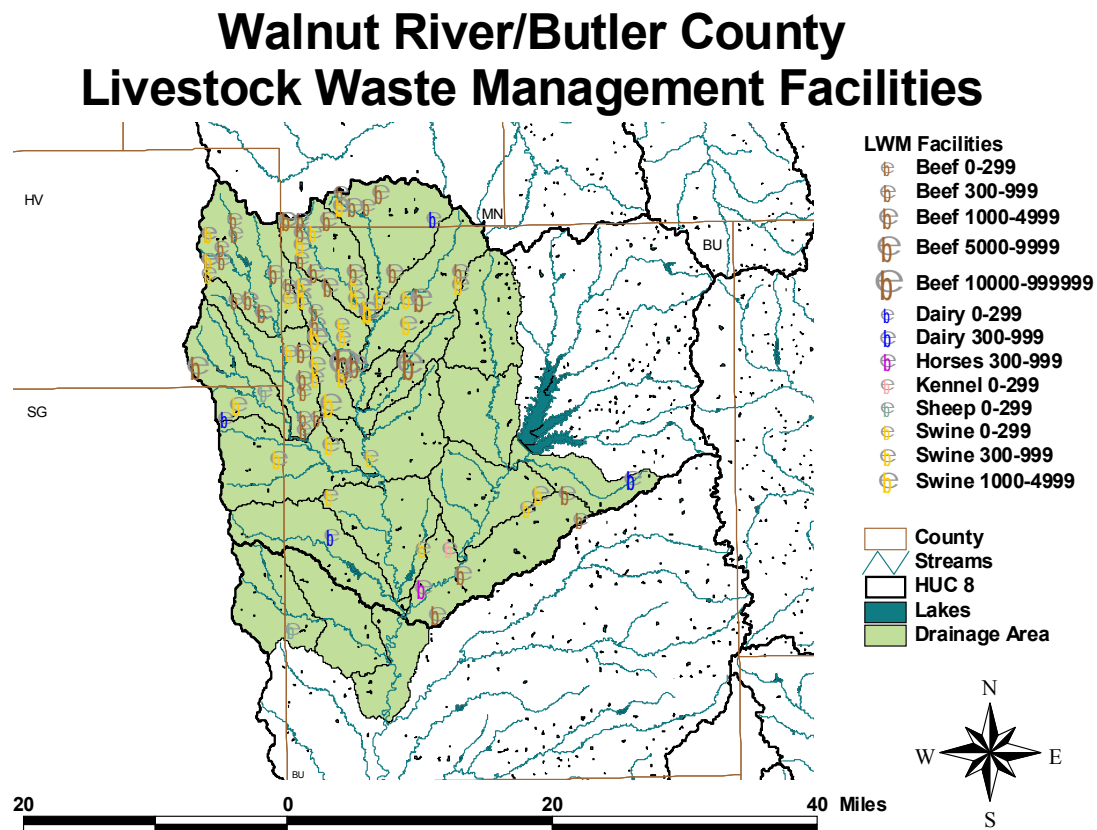


Figure 3

Land Use: Most of the watershed is grassland (43% of the area), cropland (52%), woodland (2%) or urban use (2%). (See Figure 4). The summer grazing density is low for the watershed whereas the winter grazing density is high.

On-site Waste Systems: Twenty-eight percent of households in Butler County have septic systems. The population density is high for the watershed area (60.2 people/mi²). Butler County is expecting major growth over the next 20 years. Kansas Water Office projections estimate population growth in the unincorporated areas of the county to grow 37% between 2000 and 2020. This population base will likely utilize on-site wastewater systems. However, the number of failing systems will likely diminish through efforts of the Local Environmental Protection Program and by their low volume nature, only such failing systems close to the streams will likely have an impact on ambient stream water quality.

Contributing Runoff: The watershed's average soil permeability is 0.5 inches/hour according to NRCS STATSGO data base. About 100% of the watershed produces runoff even under relative low (1.5"/hr) potential runoff conditions. Under very low (<1"/hr) potential conditions, this potential contributing area reduced (93.6%). Runoff is chiefly generated as infiltration excess with rainfall intensities greater than soil permeabilities. As the watersheds' soil profiles become saturated, excess overland flow is produced. Generally, storms producing less than 0.5"/hr of rain will generate runoff from only 37.7% of this watershed, chiefly along the stream channels.

Background Levels: Two percent of the Walnut River watershed is woodland. Leaf litter falls into the streams and decomposes increasing the oxygen demand. Background levels of total suspended solids come from geological sources. Sediment becomes suspended during high flow events as soil along the banks is eroded.

Walnut River/Butler County Land Use

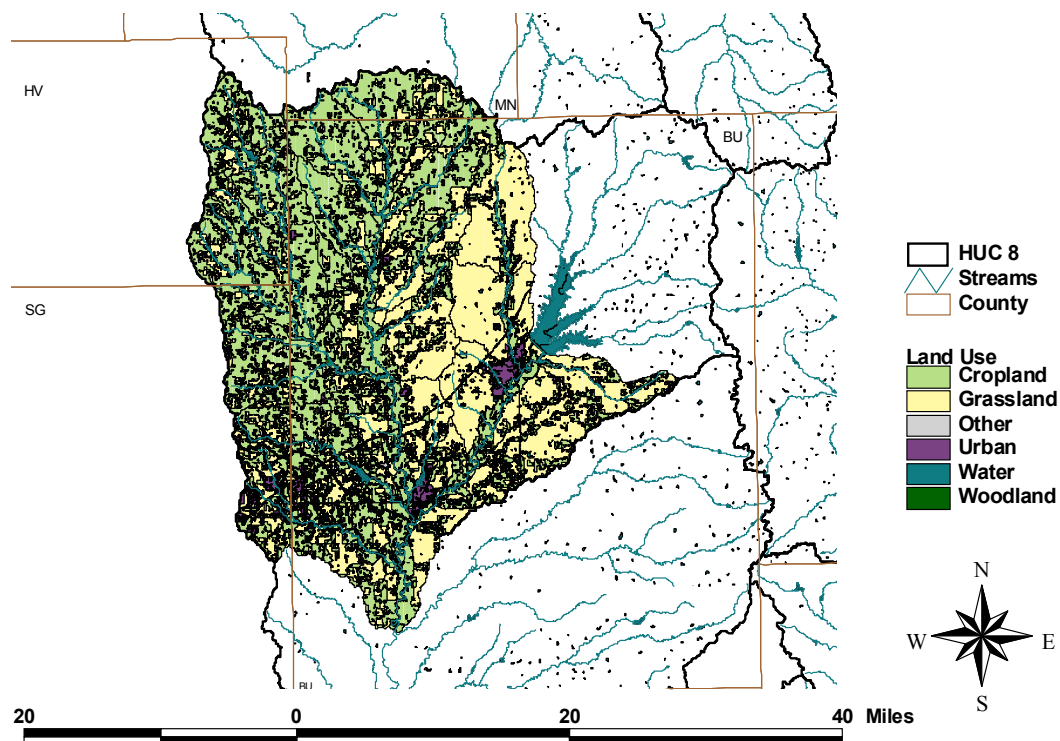


Figure 4

4. ALLOCATION OF POLLUTION REDUCTION RESPONSIBILITY

There should be a direct relation between levels of Total Suspended Solids, Biochemical Oxygen Demand, and ammonia loading and biological integrity. Decreased loads should result in aquatic communities, indicative of improved water quality. However, the biological and chemical data for this portion of the Walnut River do not indicate significantly different levels of these impairing pollutants regardless of MBI values. Additionally, it appears that the point sources potentially contributing impacts to the aquatic community of the river are already performing at a high level of treatment for these three parameters.

Because biological integrity is a function of multiple factors, the initial TMDL goal will be to maintain ambient concentrations of TSS, BOD, and ammonia at or below the average seen when MBI values lie below the critical value of 4.5, respectively, 60 mg/l, 4.9 mg/l and 0.045 mg/l. This goal will apply over the range of flows encountered on the Walnut River, indicated by the TMDL curves in the Appendix. Future monitoring will be designed to uncover the actual reasons for the impairment, and this TMDL will be adjusted to reflect the new information.

For this phase of the TMDL, an average condition is considered across the seasons, to establish goals of the endpoint and desired reductions. Therefore, average ambient levels are multiplied by the flows estimated for the Walnut River. This is represented graphically by the integrated area under each load duration curve established by this TMDL. The area is segregated into allocated areas assigned to point sources (WLA) and nonpoint sources (LA). Future growth in wasteloads should be offset by reductions in the loads contributed by nonpoint sources. This offset along with appropriate limitations should eliminate the impairment. This TMDL represents the “Best Professional Judgment” as to the expected relationship between these sources and the expected MBI score.

Point Sources: There are ten municipal facilities releasing effluent into the watershed. The translation of their existing loads into the ambient loads seen at the monitoring site is unknown and will need to be determined in the future through monitoring of effluent and ambient receiving streamflow. Assuming the total design effluent volume arrives at the monitoring site, that flow (12 cfs) would likely influence conditions under the 7Q10. Given that the partial support indications from the MBI tended to occur under flow conditions which were exceeded 80% of the time or more, the allocation for point sources is demarcated by the area under each load duration curve for ammonia, TSS, and BOD, bounded from 80% to 100%. At this stage of the TMDL, the assumed condition is maintenance of current average conditions during periods of full support at those low flows, presuming some of the offset of lower nonpoint source loading at higher flows.

The Wasteload Allocation represents the load in the stream which the point sources contribute. In most cases, this is a function of permit limits and plant performance; in the case of nutrients and BOD, there are some assimilation and degradation of the constituents in transit while flowing downstream. Further refinement of this allocation will come with information on effluent concentrations and developed nutrient criteria for streams, resulting in specific permit limits in the second stage of this TMDL. As previously noted in the source assessment, non-discharging

lagoons of municipal facilities and agricultural livestock waste management systems do not discharge with sufficient frequency or duration to cause an impairment in the Walnut River watershed. As such those facilities will have a Wasteload Allocation of zero. Typically, if these facilities discharge in the event of an intense rainfall occurrence, the corresponding streamflow from the watershed as a whole will be in the vicinity of the 1-5 percent exceedance and would transport any pollutant load swiftly out of the river system.

Nonpoint Sources: Given the runoff characteristics of the watershed, overland runoff can easily carry sediment, BOD, and ammonia from the watershed into the stream reaches. The composition of the watershed indicates a mixture of rural and urban nonpoint sources which may contribute to the downstream impairment. These sources tend to become dominant under higher flow conditions. Therefore, the area under the load duration curves bounded from 1-80% constitutes the Load Allocation for this TMDL.

Defined Margin of Safety: Given the variable nature of the MBI values seen on this stream, additional biological measures are necessary to assure indications of good aquatic community health. Therefore, the defined Margin of Safety for this TMDL will be a proportion of EPT individuals making up at least 60% of the sample population, including ammonia intolerant species, when MBI values are 4.5 or lower. This will ensure that the majority of aquatic macroinvertebrate population is composed of pollution intolerant taxa. This measure may also correlate with the availability of adequate habitat in the stream to support such a community.

State Water Plan Implementation Priority: Because this watershed is impaired by a multitude of unknown causes, including possible point and nonpoint pollutants as indicated by biological monitoring, this TMDL will require additional linkage assessment between sources and impacted stream biological metrics and will be a Medium Priority for implementation, while additional source assessment is done.

Unified Watershed Assessment Priority Ranking: This watershed lies within the Lower Walnut River Subbasin (HUC 8: 11030018) with a priority ranking of 42 and the Upper Walnut River Subbasin (HUC 8: 11030017) with a priority ranking of 44. Both subbasins are medium priority for restoration work.

Priority HUC 11s and Stream Segments: Because of the increasing urbanization, point sources along the western half of the watershed will take priority (HUC 11s 11030017010, 11030018010, and 11030017020).

5. IMPLEMENTATION

Desired Implementation Activities

1. Assess stream stability condition and impairments where organic and sediment deposition has occurred.
2. Maintain necessary conservation tillage and contour farming to minimize cropland erosion.
3. Install necessary grass buffer strips along streams.

4. Reduce activities within riparian areas
5. Evaluate turbidity conditions of biology, sediment, organic matter, and nutrients
6. Implement necessary nutrient management plans to manage manure application to land
7. Monitor wastewater discharges for toxic ammonia and BOD loadings

Implementation Programs Guidance

NPDES - KDHE

- a. Monitor effluent from wastewater systems to determine their BOD and ammonia contributions and ambient concentrations of receiving streams.
- b. Ensure proper monitoring, permitting, and operations of municipal wastewater systems to limit ammonia and BOD discharges.
- c. Review adequacy of wastewater treatment systems along western edge of watershed to handle growing demand and provide appropriate treatment.

Nonpoint Source Pollution Technical Assistance - KDHE

- a. Support Section 319 demonstration projects for reduction of sediment runoff from agricultural activities.
- b. Provide technical assistance on practices geared to establishment of vegetative buffer strips.
- c. Provide technical assistance on sediment management in vicinity of streams.
- d. Assist evaluation of stormwater quality from urbanized areas along western edge of watershed.

Water Resource Cost Share & Nonpoint Source Pollution Control Programs - SCC

- a. Apply conservation farming practices, including terraces and waterways, sediment control basins, and constructed wetlands.
- b. Provide sediment control practices to minimize erosion and sediment

Riparian Protection Program - SCC

- a. Establish or reestablish natural riparian systems, including vegetative filter strips and streambank vegetation.
- b. Develop riparian restoration projects
- c. Promote wetland construction to assimilate sediment and organic matter loadings

Buffer Initiative Program - SCC

- a. Install grass buffer strips near streams.
- b. Leverage Conservation Reserve Enhancement Program to hold riparian land out of production.

Stream Channel Assessment and Restoration - SCC and KDHE

- a. Evaluate stream channel, beds, and banks for stability
- b. Prepare initial recommendations for any channel restoration activity.

Extension Outreach and Technical Assistance - Kansas State University

- a. Educate agricultural producers on sediment and pasture management
- b. Provide technical assistance on buffer strip design and minimizing cropland runoff

Riparian Ecosystem Assessment and Planning - KWO

- a. Work with the U.S. Army Corps of Engineers to direct stream assessment efforts and basis to aquatic life impacts along main channel of Walnut River
- b. Incorporate necessary restoration guidance to agencies within Walnut Basin Plan
- c. Coordinate with Tulsa District, Corps of Engineers on low flow releases from El Dorado Lake to maintain adequate flow over riffle substrates in the Walnut River.

Time Frame for Implementation: Priority consideration for installing pollution reduction practices within the stream drainage should be made after the year 2007. Evaluation of local water quality improvements in the watershed should occur prior to 2007 along with evaluation and upgrade of any inadequate point source contributors.

Targeted Participants: Primary participants for implementation will be agricultural producers operating within the drainage as well as the point sources of the watershed. Initial work should include an inventory of activities in those areas with greatest potential to impact the stream, including, within a mile of the stream:

1. Urbanized areas of watershed
2. Total rowcrop acreage
3. Cultivation alongside stream
4. Condition of riparian areas
5. Condition of channel bed and banks

Some inventory of local needs should be conducted in 2002 - 2003 to identify such activities. Such an inventory would be done by local program managers with appropriate assistance by commodity representatives and state program staff in order to direct state assistance programs to the principal activities influencing the quality of the streams in the watershed during the implementation period of this TMDL.

Municipal point sources will initiate monitoring and appropriately treat effluent to reduce any excessive BOD or ammonia. Some assessment of stormwater quality coming from urbanized areas of the watershed will be needed to direct any appropriate stormwater management practices. Evaluation of channel conditions will be made over 2003 - 2007 by an interagency stream evaluation team.

Milestone for 2007: The year 2007 marks the midpoint of the ten-year implementation window for the watershed. At that point in time, adequate source assessment should be complete which allows an allocation of resources to responsible activities contributing to the sediment

impairment. Additionally, biological data from Walnut River over 2002-2007 should not indicate trends of reduced support of the aquatic community. Average concentration of total suspended solids, BOD, and ammonia should be declining to levels commensurate with macroinvertebrate indices showing full support of the aquatic life function.

Delivery Agents: The primary delivery agents for program participation will be the conservation districts for programs of the State Conservation Commission and the Natural Resources Conservation Service. Producer outreach and awareness will be delivered by Kansas State Extension and agricultural interest groups such as Kansas Farm Bureau or Kansas Livestock Association, the Kansas Pork Producers Council, and the Kansas Dairy Association. Channel evaluations will be done by personnel of the State Conservation Commission and KDHE. KDHE will work with municipalities to upgrade appropriate waste water systems.

Reasonable Assurances:

Authorities: The following authorities may be used to direct activities in the watershed to reduce pollution.

1. K.S.A. 65-164 and 165 empowers the Secretary of KDHE to regulate the discharge of sewage into the waters of the state.
2. K.S.A. 65-171d empowers the Secretary of KDHE to prevent water pollution and to protect the beneficial uses of the waters of the state through required treatment of sewage and established water quality standards and to require permits by persons having a potential to discharge pollutants into the waters of the state.
3. K.A.R. 28-16-69 to -71 implements water quality protection by KDHE through the establishment and administration of critical water quality management areas on a watershed basis.
4. K.S.A. 2-1915 empowers the State Conservation Commission to develop programs to assist the protection, conservation and management of soil and water resources in the state, including riparian areas.
5. K.S.A. 75-5657 empowers the State Conservation Commission to provide financial assistance for local project work plans developed to control nonpoint source pollution.
6. K.S.A. 82a-901, *et seq.* empowers the Kansas Water Office to develop a state water plan directing the protection and maintenance of surface water quality for the waters of the state.
7. K.S.A. 82a-951 creates the State Water Plan Fund to finance the implementation of the *Kansas Water Plan*.
8. The *Kansas Water Plan* and the Walnut Basin Plan provide the guidance to state agencies to coordinate programs intent on protecting water quality and to target those

programs to geographic areas of the state for high priority in implementation.

Funding: The State Water Plan Fund annually generates \$16-18 million and is the primary funding mechanism for implementing water quality protection and pollution reduction activities in the state through the Kansas Water Plan. The state water planning process, overseen by the Kansas Water Office, coordinates and directs programs and funding toward watersheds and water resources of highest priority. Typically, the state allocates at least 50% of the fund to programs supporting water quality protection. This watershed and its TMDL are a **Medium Priority** consideration. Priority should be given to activities which reduce loadings of sediment and organic material to the stream after 2007.

Effectiveness: Sediment control has been proven effective through conservation tillage, contour farming and use of grass waterways and buffer strips. The key to success will be widespread utilization of conservation practices within the watersheds cited in this TMDL.

Technology exists for BOD and ammonia removal and can be placed in wastewater systems with proper planning and design. Expansion of some systems may be necessary to accommodate growth pressures.

Should participation significantly lag below expectations over the implementation period or monitoring indicates lack of progress in improving water quality conditions from those seen over 1982-2001, the state may employ more stringent conditions on agricultural producers in the watershed through establishment of a Critical Water Quality Management Area in order to meet the desired endpoints expressed in this TMDL.

6. MONITORING

At first, KDHE will continue to collect seasonal biological samples from Walnut River for three years over 2002 - 2007 and an additional three years over 2007-2011 to evaluate achievement of the desired endpoint. Monitoring of TSS, BOD, and ammonia content of wastewater discharged from treatment systems will be expected under new and reissued NPDES and state permits, including ambient monitoring above and below the facilities, and tracking contributions of facilities downstream to the monitoring site.

Additional source assessment needs to be conducted and local program management needs to identify its targeted participants of state assistance programs for implementing this TMDL. This information should be collected in 2002-2007 in order to support appropriate implementation projects.

7. FEEDBACK

Public Meetings: Public meetings to discuss TMDLs in the Walnut Basin were held January 10 and March 7, 2002 in Augusta. An active Internet Web site was established at

<http://www.kdhe.state.ks.us/tmdl/> to convey information to the public on the general establishment of TMDLs and specific TMDLs for the Walnut Basin.

Public Hearing: A Public Hearing on the TMDLs of the Walnut Basin was held in Augusta on June 5, 2002.

Basin Advisory Committee: The Walnut Basin Advisory Committee met to discuss the TMDLs in the basin on October 4, 2001, January 10, March 7, and June 5, 2002.

Discussion with Interest Groups: Meetings to discuss TMDLs with interest groups include:
Kansas Farm Bureau: February 27 in El Dorado

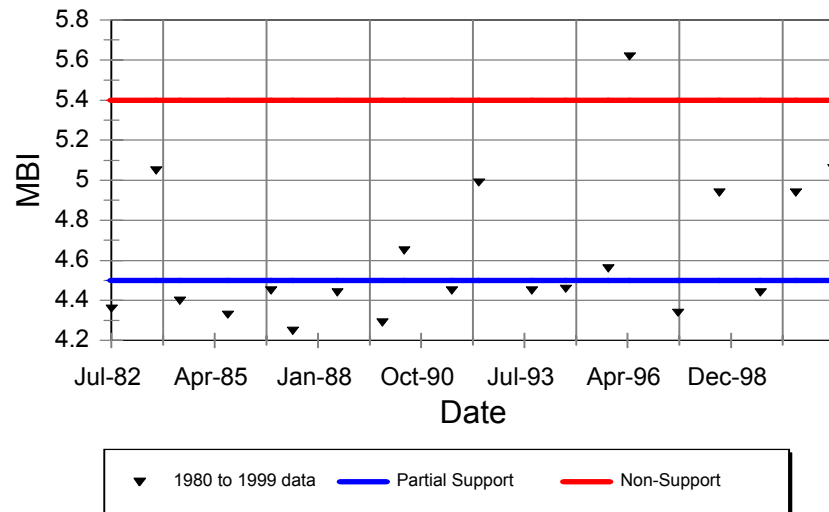
Milestone Evaluation: In 2007, evaluation will be made as to the amount of water quality improvement activity which has occurred within the watershed and current condition of the Walnut River. Subsequent decisions will be made regarding the implementation approach and follow up of additional implementation in the watershed.

Consideration for 303(d) Delisting: The stream will be evaluated for delisting under Section 303(d), based on the monitoring data over the period 2007-2011. Therefore, the decision for delisting will come about in the preparation of the 2012 303(d) list. Should modifications be made to the applicable water quality criteria during the ten-year implementation period, consideration for delisting, desired endpoints of this TMDL and implementation activities may be adjusted accordingly.

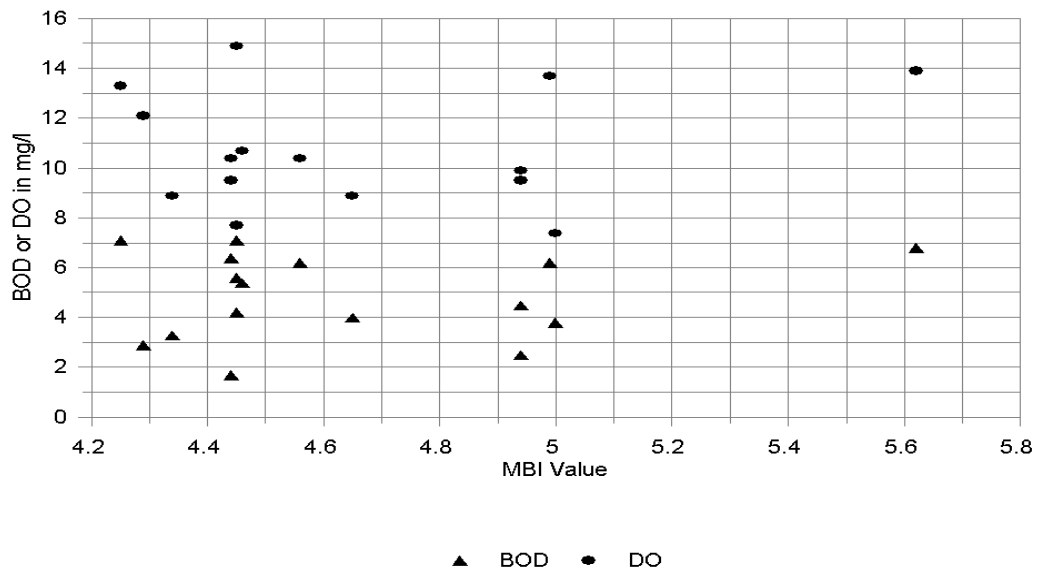
Incorporation into Continuing Planning Process, Water Quality Management Plan and the Kansas Water Planning Process: Under the current version of the Continuing Planning Process, the next anticipated revision will come in 2003 which will emphasize revision of the Water Quality Management Plan. At that time, incorporation of this TMDL will be made into both documents. Recommendations of this TMDL will be considered in *Kansas Water Plan* implementation decisions under the State Water Planning Process for Fiscal Years 2003-2007.

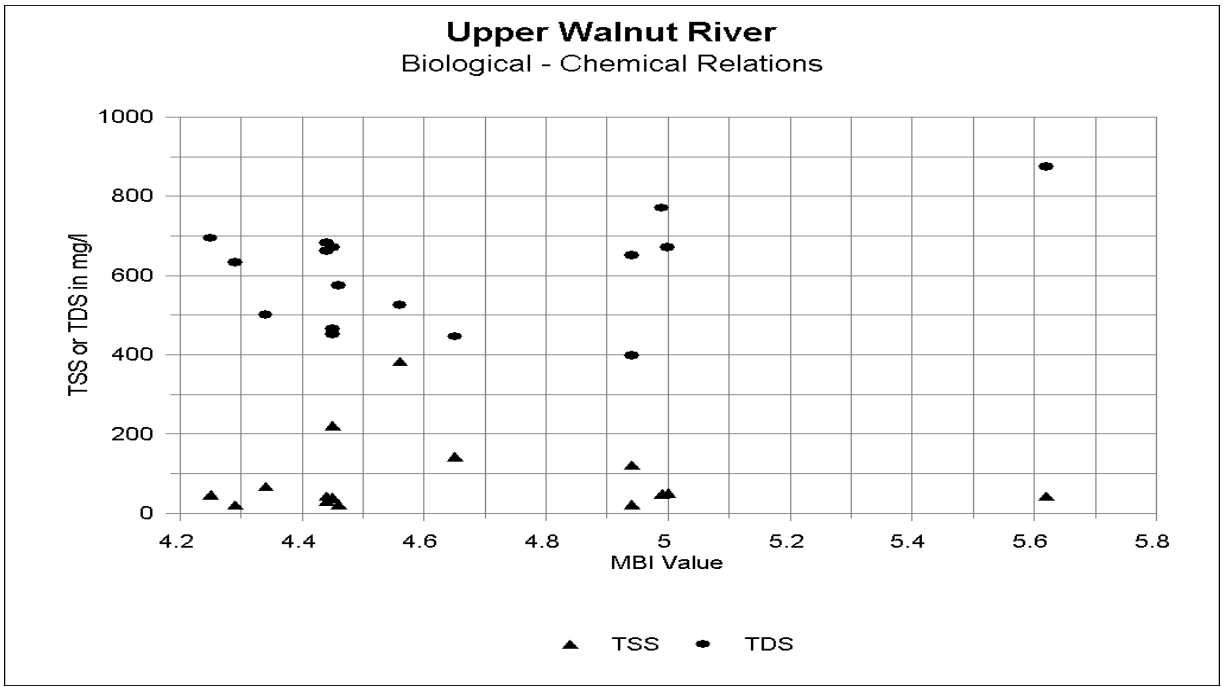
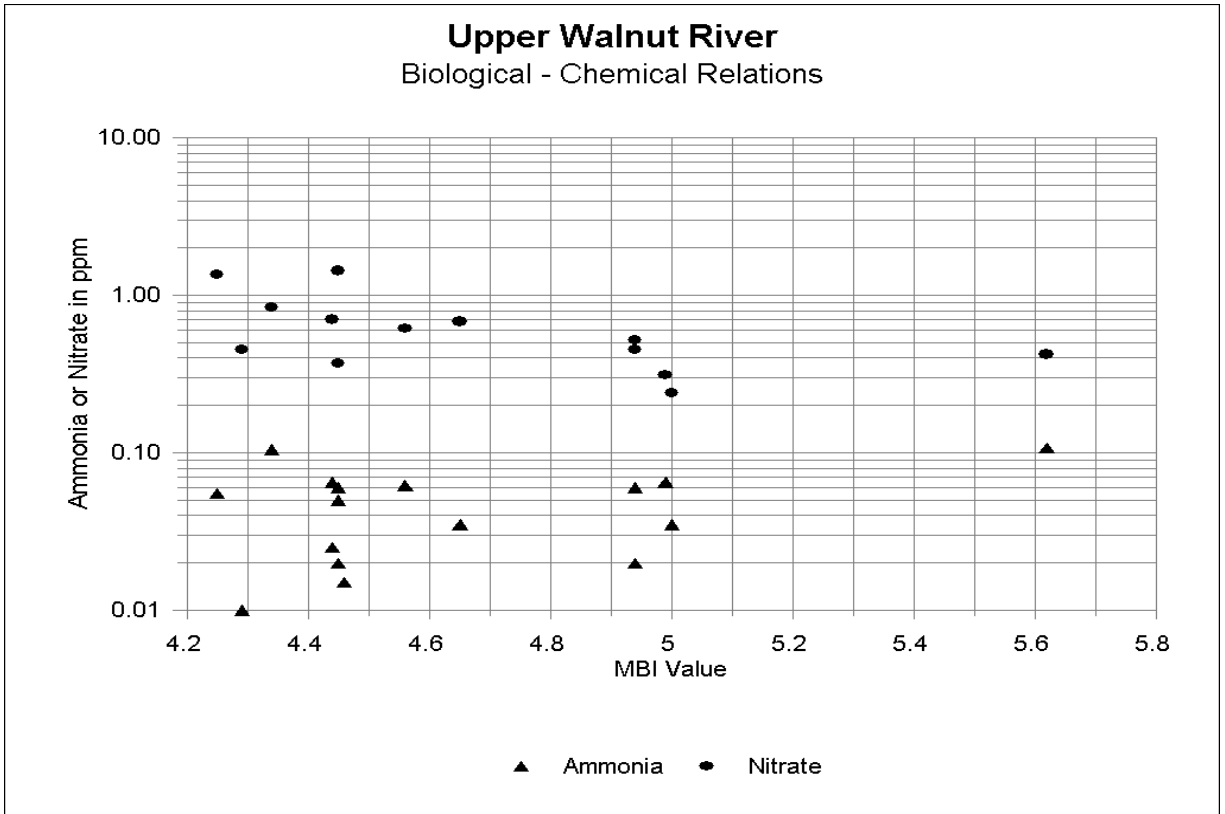
APPENDIX A

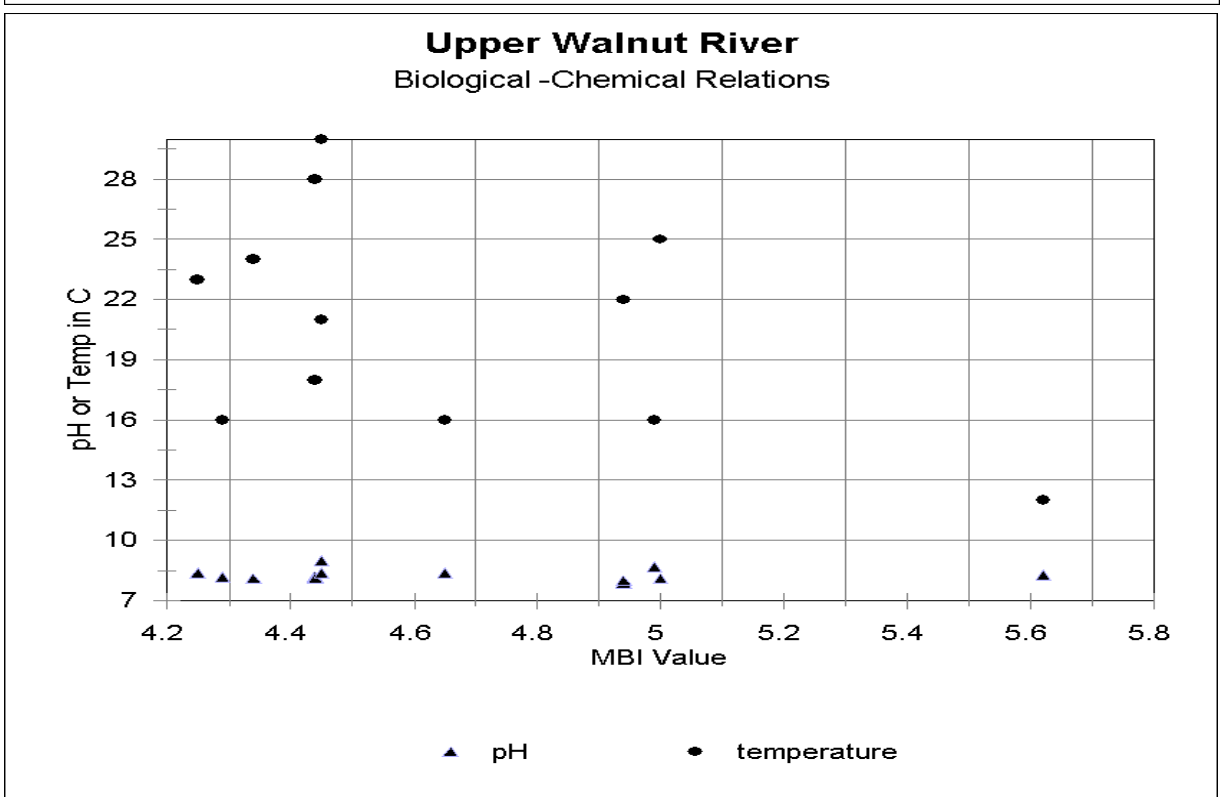
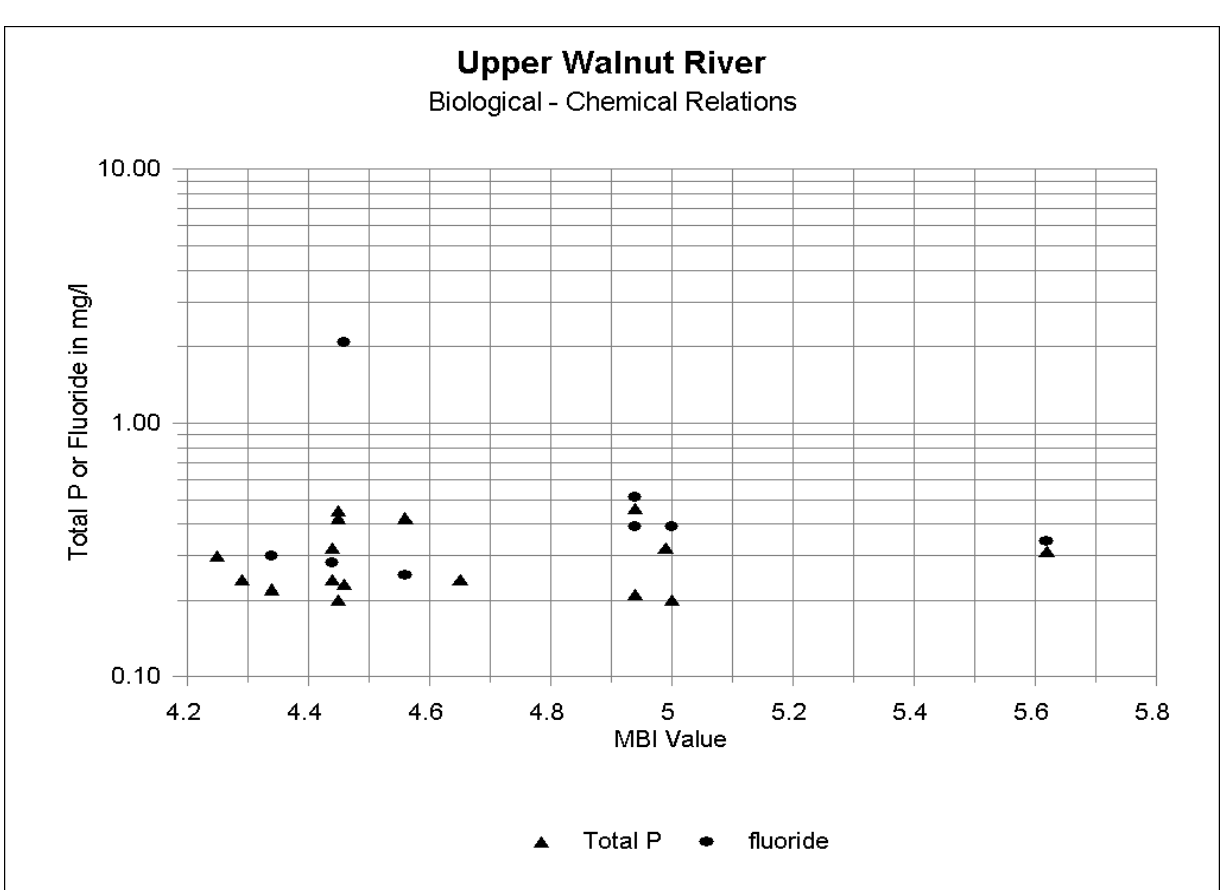
Walnut River at Gordon- Station 106 Nutrients/Biochemical Oxygen Demand



Upper Walnut River Biological - Chemical Relations

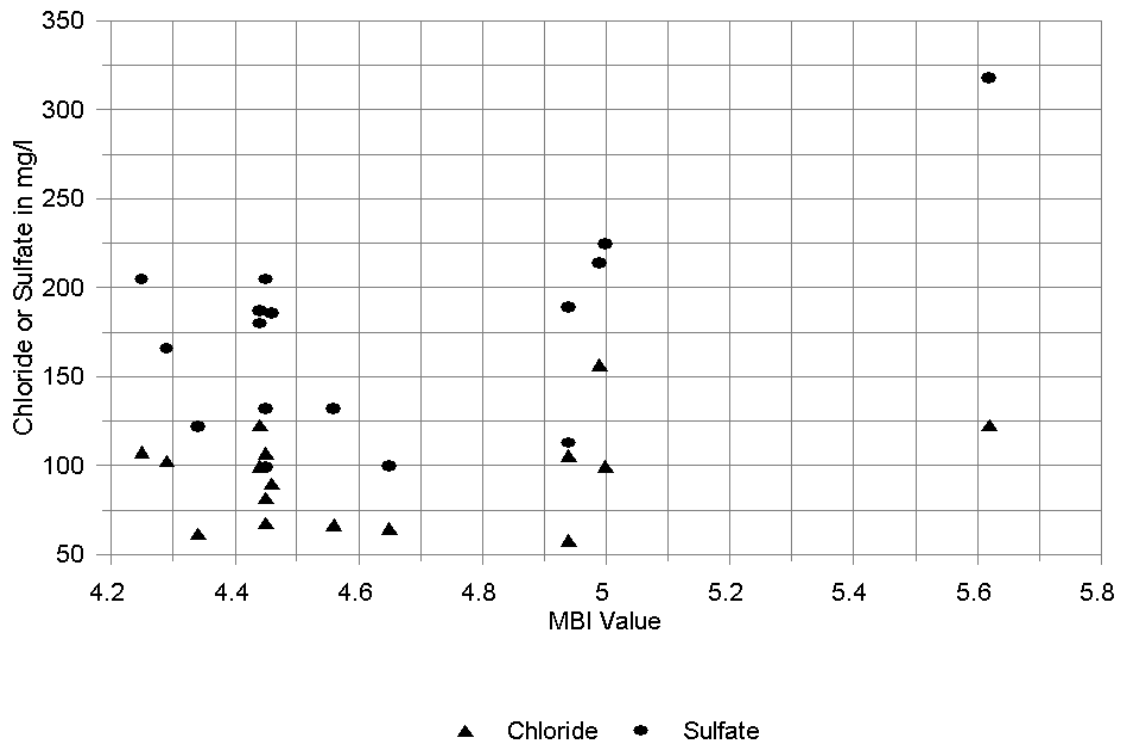






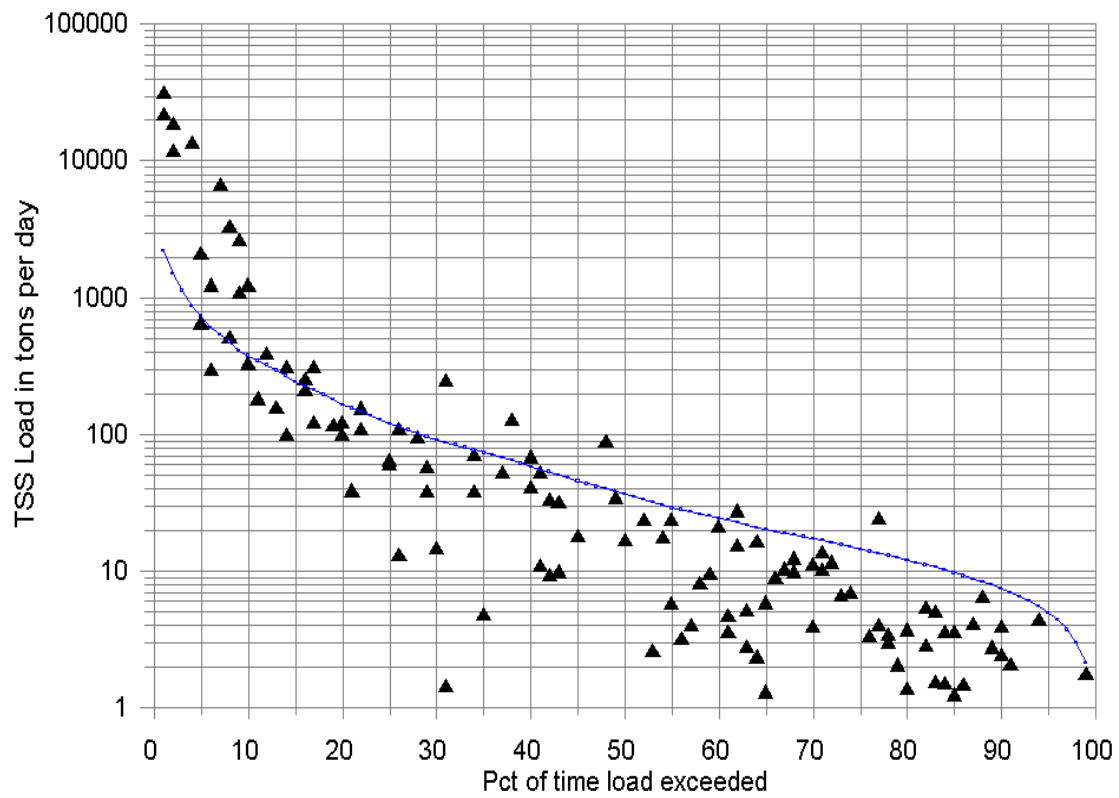
Upper Walnut River

Biological - Chemical Relations

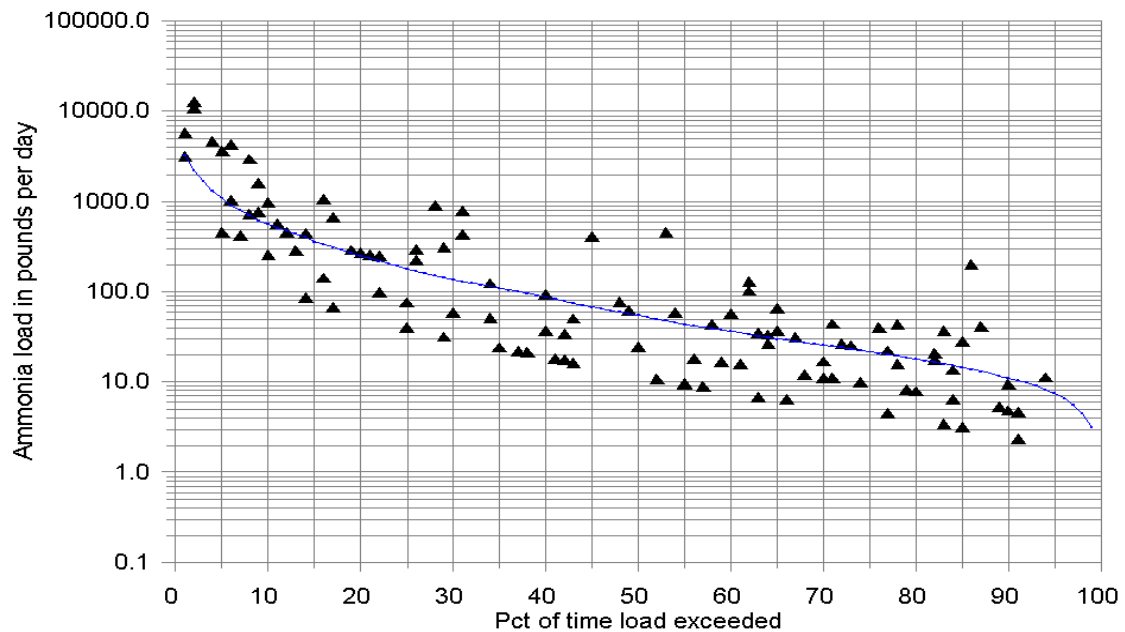


APPENDIX B

Walnut River - Butler County Biological TMDL - TSS

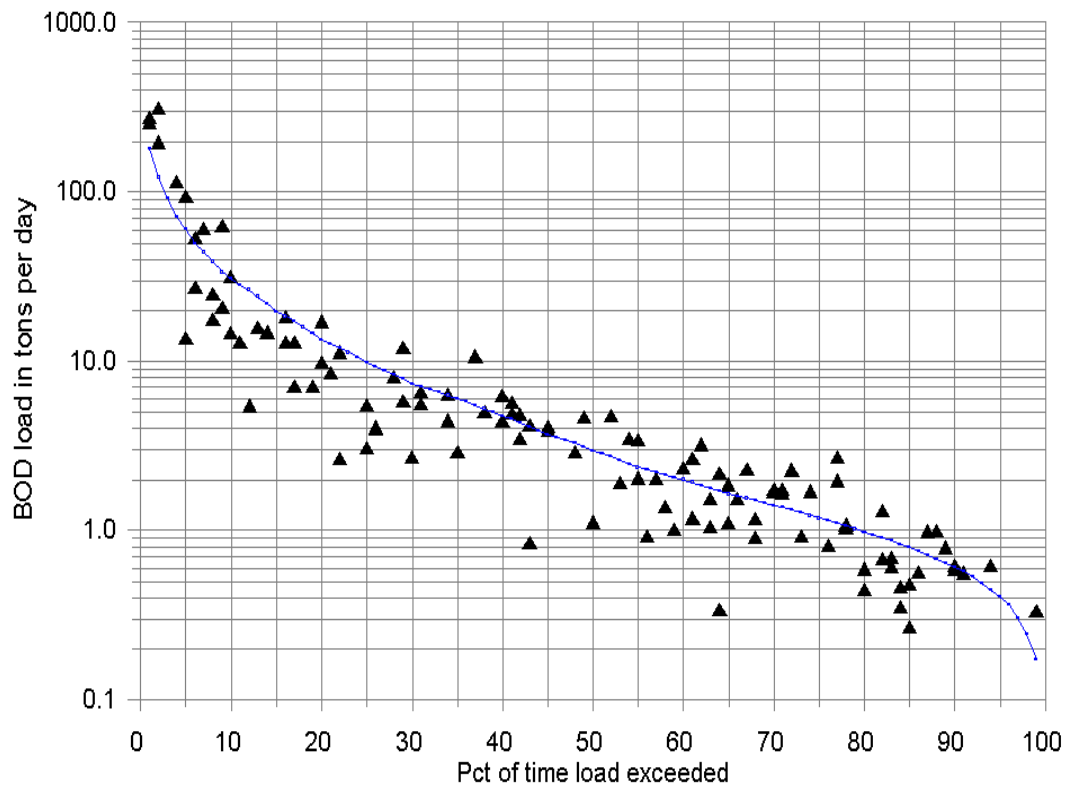


Walnut River-Butler County
Biological TMDL - Ammonia



Walnut River-Butler County

Biological TMDL - BOD



APPENDIX C

Estimated Existing Loads

NPDES Permitted Facilities*	Permit Limits (mg/L)			Design Flow (MGD)	Permitted Load (lb/day)			Average & (Maximum Concentration (mg/L)^			Median Flow (MGD)
	NH3	BOD	TSS		NH3 Load	BOD Load	TSS Load	NH3	BOD	TSS	
Andover WWTP	1.9	26	30	1.200	19.0	260.5	300.6	0.4 (0.7)	4.2 (5.7)	3.3 (6.5)	
Augusta WWTP	4.2	30	30	1.500	52.6	375.8	375.8	0.2 (0.4)	3.8 (5)	4.1 (10)	
Benton WWTP	monitor	30	80	0.076	monitor	19.0	50.8				No Discharge
Elbing WWTP	monitor	30	80	0.029	monitor	7.3	19.4	monitor	17.3 (19.6)	43.0 (45)	
El Dorado WWTP	5.2	30	30	1.750	76.0	438.4	438.4	1.0 (2.6)	8.4 (13.4)	14 (36)	1.7
El Dorado Mobile Home Estates	monitor	30	80	0.007	monitor	1.7	4.6				No Discharge
Four Mile Creek Regional WWTP	4.1	27	30	3.000	102.8	676.4	751.5	1.4 (9.0)	9.3 (46)	6.5 (39)	1.1
KTA - Towanda Service Area	monitor	30	80	0.012	monitor	2.9	7.7	1.2 (3.4)	25.9 (45)	70.6 (172)	
Towanda WWTP	8.4	30	30	0.190	13.3	47.6	47.6	monitor	4.8 (7.5)	4.7 (18.4)	
Whitewater WWTP	3.5	30	30	0.162	4.7	40.6	40.6	0.1 (0.4)	3.2 (7.6)	23.3 (233)	
Total Load from WWTPs				7.926	268.4	1,870.1	2,036.9				
Current Load to Walnut River based on median flow and average concentrations					73.2	5,639.4	94,790.5				

* These wastewater treatment plants were designed to meet Kansas Water Quality Standards. ^May 2001 to April 2002 Effluent Data

Andover WWTP was upgraded in 1996 to be fully nitrifying.

Augusta WWTP was upgraded in 2001 to be fully nitrifying and denitrifying.

Benton WWTP has a three cell lagoon that has adequate capacity and rarely discharges.

Elbing WWTP expanded in 1999 to a three cell, 120 day detention lagoon.

El Dorado WWTP will be replacing its current plant with an activated sludge plant which nitrifies and denitrifies plant within four years.

El Dorado Mobile Home Estates has a two cell lagoon with over 150 day detention.

Four Mile Creek Regional WWTP is currently being upgraded and expanded to a 3.0 MGD design flow, fully nitrifying and denitrifying plant.

KTA - Towanda Service Area is building a new, non-discharging lagoon within a year.

Towanda WWTP currently provides full nitrification.

Whitewater WWTP will be abandoned, and a new three cell, 120 day detention lagoon will be built within three years.

Approved September 30, 2002